

REMARKS

Applicant expresses appreciation to the Examiner for consideration of the subject patent application and the courtesies extended in an interview between applicant's representative and the Examiner on April 8, 2004. This amendment is in response to the Office Action mailed March 11, 2004 and takes into account the issues discussed in said interview. Claims 11-15 were objected to. Claims 1-27 were rejected. The claims and the specification have been amended to address the concerns raised by the Examiner.

Claims 1-10, 16-27 were originally presented. The Examiner has renumbered claims 16-27 originally presented so that they are consecutively claims 1-22, which numbering has been used herein. Claims 1-22 remain in the application. Claims 1, 5, and 21 have been amended. Claims 23-47, which are all dependent claims, have been added.

Drawing Objections

The drawings were objected to under 37 C.F.R. § 1.83(a) for not showing every feature of the invention specified in the claims. The drawing objections concerned the illustration of the distance between the diaphragm and the magnetic structure being different at a central portion of the diaphragm from that toward edges of the diaphragm. As discussed on April 8, this is shown, for example at FIG. 8, reference numbers 31a, b, and c. Reconsideration is requested.

Objection to IDS

Objection was made to the IDS (but not to the supplemental IDS(s) submitted) in that a copy of W/O 01/08449 was not provided. A copy of the reference is enclosed. Reconsideration is requested.

Background and Issues Raised in this Application

The present invention concerns a planar magnetic electro-acoustic transducer (PMT). A particular advantage obtained by implementation of the present invention is that such a transducer using a tensioned diaphragm can be made more efficient, and therefore more commercially viable. Due to the relatively more compact size enabled in devices in accordance with the disclosure of the application, these transducers can have numerous applications where

prior PMT devices, and more conventional loudspeaker types, are less suitable. For example, it has been found that when conventional loudspeakers in a hanger deck of an aircraft carrier are replaced with an array of planar magnetic speakers (from the assignee of the present invention) configured as a line source in an upper corner between a wall and a ceiling of the hanger deck, an improvement in clarity of reproduced sound heard by personnel on the hanger deck is obtained, while essentially no additional usable space is taken up by the transducers. Moreover, in car and home audio applications the shape aspects and sound reproduction quality of PMTs are desirable. These are just some examples of the advantages of the technology, and the invention concerns making this technology more viable from economic and performance standpoints, for example.

In accordance with one aspect of the invention, and as taught in the disclosure of the application, a PMT with a tensioned diaphragm is driven more strongly in a central portion of the diaphragm. Contrary to conventional design goals of PMT designers to drive the face of the diaphragm as a planar surface, *i.e.* piston-like, the inventors have recognized that gains in efficiency outweigh disadvantages of driving the diaphragm more like a drum head (as it is, after all, a tensioned diaphragm). With a center-weighted force concentrated where the diaphragm excursion can be greatest (the central portion) with the least amount of energy input, and tapering off the driving force moving toward edges where it is constrained, more effective use of magnetic material is obtained, and output is improved. Recall that toward the edges where the diaphragm is attached, or damped or grasped, or otherwise constrained, less excursion is possible due to geometry, as the inventors have recognized, and higher resistance to movement is inherent. They have recognized that accordingly it is more efficient use of magnetic materials and coil weight on the diaphragm to drive the diaphragm in a center-weighted, *i.e.* center-emphasized, force regime.

Moreover, in developing this concept a related inventive concept was discovered, that is that one way to increase the central magnetic field energy available to exploit is to provide a secondary support and magnetic structure on the open side of a single-ended device. This provides an open architecture for sound propagation, as large open areas in the support structure are possible, but provides the doubled-up magnetics advantages of a double-ended device over a portion of the diaphragm. Typically this is the center portion for the reasons discussed above.

But it was also discovered that by applying this secondary magnetic structure concept essentially two different kinds of PMT devices can be combined to provide a quasi-pushpull

device having characteristics of both a single ended and a double ended device. This can be used to advantage differently than the center-weighted concept discussed above, in addition to using it in the center weighted configuration. The applicants discovered that they can create a device having a hybrid set of parameters, and additional capabilities by providing a device with an essentially single ended zone and a double-ended zone on the same diaphragm. This is illustrated by embodiments shown in FIGs. 22 and 25, as examples. Other performance-enhancing features have been discovered and are disclosed in this application. Development in this technology area is ongoing.

Claim Rejections - 35 U.S.C. § 112

Claims 5 and 24 stand rejected under § 112, 2nd paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants request reconsideration of the rejection in light of the foregoing discussion and the discussion of the issues in the interview of April 8, and the amendment of claim 5 herein. If concerns remain, applicant would be appreciative of further suggestions from the Examiner.

Claim Rejections - 35 U.S.C. § 102

Claims 1-22 (including independent claims 1, 11, and 21) were rejected under 35 U.S.C. § 102(b) as being anticipated by *Kopinga, et al.*

In order to most succinctly explain why the claims presented herein are allowable, Applicant will direct the following remarks primarily to the originally presented independent claims, as now amended, with the understanding that once an independent claim is allowable, all claims depending therefrom are likewise allowable for at least the same reasons, being more narrow in scope.

With regard to the independent claims as amended the *Kopinga, et al.* reference does not disclose a center-weighted or otherwise uneven magnetic field in the plane of the diaphragm, but instead the reference teaches a system in which the diaphragm is driven essentially equally across its active area. Moreover, the reference does not disclose a configuration where magnets on one side of the diaphragm are unopposed by magnets on the other side of the diaphragm.

In Contrast, independent claim 1 now sets forth:

"...said transducer being configured so that the secondary support structure has a more open architecture than the primary support structure and significantly more open space allowing passage of acoustic energy with significantly less interference from the secondary support structure than the primary support structure and wherein a plurality of elongated magnets of the primary magnetic structure are without corresponding magnets in the secondary magnetic structure, the transducer thereby configured to have an essentially single-ended configuration over a portion of the diaphragm; said planar-magnetic transducer being operable as an enhanced single ended transducer."

Independent claim 11 sets forth:

"...said primary magnetic structure having at least three adjacent rows of side by side magnets with at least an outer two rows of the at least three rows of magnets providing less magnetic field strength through the conductive surface area of the diaphragm than provided through the conductive surface areas of the diaphragm by a center row of the magnets; said planar-magnetic transducer operating as a single-ended planar-magnetic transducer."

Independent claim 21 now sets forth:

" wherein the magnetic field strength is greater towards a central portion of an active area of the diaphragm between locations wherein the diaphragm is constrained from movement, and generally decreases moving away from a central portion outward toward edges of the active area in at least one dimension."

These elements are not taught in the cited reference, and accordingly reconsideration and withdrawal of the rejection is requested.

Claim Rejections - 35 U.S.C. § 103

Claims 1-20 were rejected under 35 U.S.C. § 103 as being unpatentable over *Kopinga et al.* and further in view of *Torgeson*. *Torgeson* does not teach or suggest the elements set forth above and discussed as distinctions over the *Kopinga et al.* reference. The two references together, taking into consideration the general knowledge of one skilled in the art, do not teach or

suggest the combination of elements set forth in the claims. Accordingly, for at least the reasons set forth above the independent claims as amended are patentable over the cited references.

The dependant claims now in the application as set forth above are patentable for at least the same reasons the independent claims set forth above are patentable.

CONCLUSION

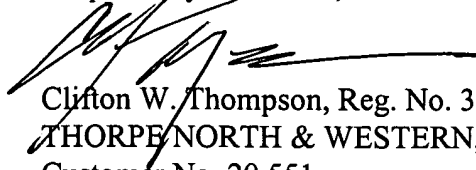
In light of the above, Applicant respectfully submits that pending claims 1-47 are now in condition for allowance. Therefore, Applicant requests that the rejections and objections be reconsidered and withdrawn, and that the claims be allowed and the application passed to issue. If any impediment to the allowance of these claims remains after entry of this Amendment, the Examiner is encouraged to call Cliff Thompson at (801) 566-6633 so that such matters may be resolved as expeditiously as possible.

A Check in the amount of \$ 180.00, is enclosed for excess claim fees due. 22 claims were pending 3 of which were independent. Excess claim fees for 27 claims, 3 independent were previously paid, accordingly 5 claims were paid for which did not appear in the application. 47 claims are now in the application, and accordingly excess claim fees for 20 claims are now due.

The Commissioner is hereby authorized to charge any additional fee or to credit any overpayment in connection with this Amendment to Deposit Account No. 20-0100.

DATED this 11th day of June, 2004.

Respectfully submitted,



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